Staff Report: Gano Street Off-ramp Design Review – Fox Point – Ward 1 *(For Action)*
Presented at April 21, 2021 BPAC meeting

Project Background

The City of Providence Department of Planning and Development seeks comments from the BPAC regarding plans developed by RIDOT for changes to the I-195 off-ramp onto Gano Street at Trenton Street. This project is included in RIDOT's plans for the I-195 "Washington Bridge" and bisects the Gano Gateway bike path connector completed in 2019.

The origin of the project is a desire from RIDOT to add a highway lane on the Washington Bridge, so that traffic entering I-195 West from the Taunton Ave on-ramp in East Providence is not required to change lanes to continue toward the junction with I-95. Currently the rightmost lane is an exit-only lane for the Gano Street off-ramp. To address this, RIDOT plans to add an additional lane in the current right-hand shoulder of the Washington Bridge between the Gano Street off-ramp and on-ramp. Doing so would bring traffic closer to the entering traffic from the Gano Street on-ramp, which due to the steep incline has poor visibility.

Description of Plans

- Moves the on-ramp to I-195 westbound from its current location to the existing off-ramp at Trenton Street
- Widens the existing ramp opposite Trenton Street by two vehicular travel lanes for the on-ramp
- Increases the corner radii on either side of the on-/off-ramp

Previous BPAC recommendations

- The ramps should remain in their current locations. **(As yet RIDOT has declined this recommendation)**

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- If the ramps must be moved, the bike path should be re-routed around the river side of the ramps. **(RIDOT cites safety concerns, environmental permitting, budget, and time as reasons they don't consider this feasible)**
- If neither of those is possible
    - Replace the crosswalk across the mouth of the ramp **(Crosswalk shown in new plans)**
    - Significant reduction in corner radii on both sides of the ramp (NACTO recommends a maximum 15 ft corner radius while the draft Great Streets Implementation Guide sets a threshold of 20 ft corner radius for special treatments) **(Radii shown as 50-65 ft, plans include truck apron to reduce radii to this level. The current ramps' radii are 30 ft.)**
    - Use no-turn-on-red arrows in the traffic signals as well as mast-arm mounted no-turn-on-red signage to restrict conflicts of turning vehicles during walk signals **(Not shown in plans but RIDOT has committed to this in a response to these recommendations. However, the Response to Comments mentions a Lead Pedestrian Interval (LPI) when an exclusive pedestrian phase would be necessary to prevent conflicts)**
    - Incorporate a bike signal in parallel to the walk signal **(The Response to Comments states that while it's okay for a walk light to conflict with vehicular turning movements, bike signals aren't supposed to conflict, and making an exclusive phase for walking and biking would delay car traffic too much)**
    - Add a curbed refuge island between the two directions of ramp traffic that is 12 feet wide at minimum (6 ft for a bike and 3 ft shy distance to traffic on either side) **(Refuge islands are included but are only 6 ft wide. Also, the Response to Comments indicates that the primary reason for the refuge islands is to preserve utility poles and the pedestrian refuge is a secondary benefit.)**
    - Take additional steps such as raised crosswalks, benches, and landscaping on either side of the ramp and the refuge island if possible to create a pedestrian and path environment that feels welcome and not an afterthought. **(The Response to Comments commits to "considering" raised crosswalks, and says "accommodations can be provided on either side of the ramp", but not on the islands themselves. No mentioned of traffic calming on the ramp such as speed lumps or transverse rumblestrips.)**
- Avoid placing bridge footings on existing path **(The Response to Comments says "The shared path would be temporarily rerouted during construction and/or slightly realigned permanently to avoid any impact from the piers.")**

<u>Changes since previous BPAC review</u>

- Ramps shifted south to reduce impact on Trenton St traffic volume & speed
- Trenton St is recommended to reverse one-way direction to run away from Gano St instead of toward Gano St
- Refuge islands are added in the maintained crosswalk across the mouth of the ramp.

RIDOT also shared with the City a traffic impact memo which calculates that the intersection of Gano St

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with Trenton St will have worse traffic because of the project: Level of Service E/F instead of B in the no-build condition. That translates to an increase in vehicular delay from 16 seconds in the no-build scenario to 60-80 seconds if the ramp is moved.

While relying exclusively on vehicular Level of Service in street design leads to excessively car-centered design, the above summary is included here to show that in addition to making walking and biking on the new Gano Gateway bike path less safe, the project will also make traffic on City streets more congested. The benefit is primarily to East Providence highway traffic, not even Providence car traffic.

City comments to RIDOT on March 19

- Encouraged RIDOT to leave both ramps as they are.
- Asked for cost estimate of re-routing path around the ramp on river side.
- Asked to consider bicycle and pedestrian Level of Traffic Stress in evaluations, not just Level of Service for driving.
- Noted that all "Build" scenarios make worse traffic on City streets.

Staff recommendations

- The ramps should remain in their current location, and lanes on the highway should not be changed in such a way to preclude the current ramp locations.
- RIDOT should produce a more detailed conceptual evaluation of re-routing the Gano Gateway path around the ramp on the Seekonk River side. Either a suitable bicycle and pedestrian crossing of the ramp at Gano Street must be provided, or the path must be rerouted to connect to the Gano Park bike path while avoiding the intersection.

- RIDOT should further implement the recommendations from the previous review, especially widening the refuge islands and reducing the corner radii.
- Traffic calming such as speed lumps or transverse rumble strips should be considered on the off-ramp to slow traffic to speeds no faster than 25 miles per hour.

Respectfully submitted by Alex Ellis.

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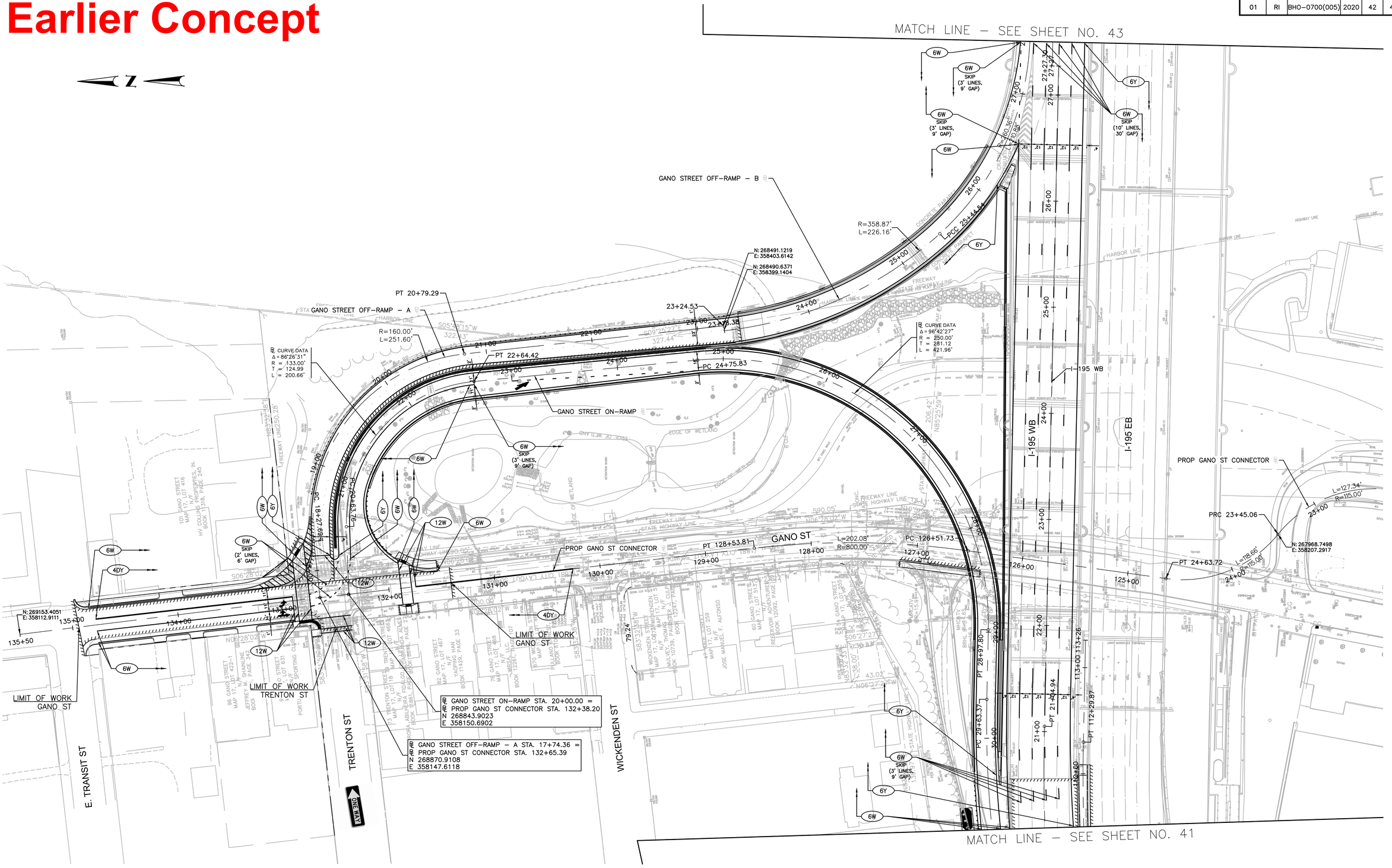
Earlier Concept

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
01	RI	BHO-0700(005)	2020	42	47



AECOM

RI dot

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

DESIGNED BY:	KM
CHECKED BY:	GS
DATE:	4/23/2020
SHEET:	42
OF:	47

SCALE: 1"=40'

GRAPHIC SCALE

REVISIONS			REVISIONS		
NO.	DATE	BY	NO.	DATE	BY

BRIDGE GROUP 57T-10
I-195 WASHINGTON NORTH PHASE 2
PROVIDENCE EAST PROVIDENCE
CONTRACT -- VOLUME: 4
RHODE ISLAND

STRIPING PLAN - 3 OF 8

57T-10_V4_011_STRP.DWG

Current DRAFT Concept

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
01	RI	BHO-0700-006	2021	44	47

MATCH LINE – SEE SHEET NO. 43

LEGEND

20.1.0 R.I. STANDARD 20.1.0 PAVEMENT MARKINGS ARROWS AND ONLY

20.3.0 R.I. STANDARD 20.3.0 CROSSWALKS AND STOP LINES

GANO STREET OFF-RAMP – B

NEW GANO STREET OFF-RAMP – A

PT 21+03.55

PC 24+49.18

PT 22+63.76

GANO STREET ON-RAMP

PROP GANO ST CONNECTOR

PC 18+52.01

PC 20+53.16

PRC 23+45.06

L=127.34'
R=115.00'

N: 267968.7498
E: 358207.2917

PT 24+63.72

L=118.66'
R=115.00'

GANO ST

PT 128+53.81

L=202.08'
R=800.00'

PC 126+51.73

PT 28+71.14

PC 29+36.71

PT 21+04.94

PT 112+29.87

113+00 113+26

I-195 WB

I-195 EB

LIMIT OF WORK
GANO ST

LIMIT OF WORK
TRENTON ST

LIMIT OF WORK
GANO ST

TRENTON ST

WICKENDEN ST

E. TRANSIT ST

ONE WAY

N: 269153.4051
E: 358112.9111

℄ GANO STREET ON-RAMP STA. 20+00.00 =
℄ PROP GANO ST CONNECTOR STA. 132+07.81
N 268813.7076
E 358154.1300

℄ NEW GANO STREET OFF-RAMP – A STA. 17+98.73 =
℄ PROP GANO ST CONNECTOR STA. 132+34.89
N 268840.6106
E 358151.0644

MATCH LINE – SEE SHEET NO. 41

AECOM

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

DESIGNED BY:	##
CHECKED BY:	##
DATE:	FEBRUARY 2021
SHEET:	44
OF:	81

SCALE: 1"=40'

GRAPHIC SCALE

REVISIONS			REVISIONS		
NO.	DATE	BY	NO.	DATE	BY

BRIDGE GROUP 57T-10
I-195 WASHINGTON NORTH PHASE 2
CONTRACT -- VOLUME: 4 RHODE ISLAND
PROVIDENCE
EAST PROVIDENCE

STRIPING PLAN - 3 OF 8

57T-10_V4_011_STRP.DWG

TRANSPORTATION ENGINEERS & PLANNERS

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MEMORANDUM
WASHINGTON BRIDGE TRAFFIC OPERATIONS

TO: Anthony Pompei, RIDOT Project Manager
FROM: Maureen Chlebek - McMahon
PROJECT: Bridge Group 57T-10: Washington North Phase 2
SUBJECT: Washington Bridge – Traffic Operations
DATE: March 9, 2021

As requested, McMahon has prepared a summary of the traffic operations for the Washington Bridge project referenced above. Under Build conditions, the existing Gano Street I-195 westbound on-ramp will be relocated to the Gano Street/Trenton Street signalized intersection, as shown in Figure 1. As such, this memorandum focuses on the signalized intersection of Gano Street at Trenton Street/I-195 Westbound On/Off-Ramp and the unsignalized intersection of Gano Street and Wickenden Street. The Gano Street at Trenton Street/I-195 westbound ramps intersection has been modified from the original Base Technical Concept (BTC) to help to mitigate the potential of wrong way driving, reduce the crossing lengths spanning the I-195 ramps, and mitigate impacts to existing utilities along Gano Street.

The original BTC maintains the current roadway one-way eastbound configuration of Trenton Street. As part of the original BTC, several utility poles required relocation. The number of southbound vehicles making left turns onto the relocated on-ramp require two lanes to be able to manage the future volumes. The signal was proposed to operate as split phasing for the northbound and southbound approaches. The eastbound and westbound approaches were proposed to operate concurrently. A Lead Pedestrian Interval (LPI) was also proposed to give pedestrians the opportunity to enter the intersection for a few seconds before the vehicles in the direction of the crossing receive a green signal indication. As part of the review of the Interchange Justification Report (IJR), Federal Highway Administration (FHWA) indicated that the proposed roadway configuration, provided in the original BTC, may be prone to wrong way driving as traffic on Trenton Street were aligned towards the off-ramp. As a result of these comments a revised BTC was developed.

These geometric changes include realigning of the I-195 ramps to intersect Gano Street approximately 60 feet south of the intersection with Trenton Street. This offset configuration will be expected to reduce the potential for wrong way driving. Signalized channelized right turns for the northbound and westbound approaches are also proposed, with raised islands to allow for pedestrian refuge when crossing the I-195 westbound ramps. With the current configuration of Trenton Street, the signal would operate as split phasing for the four approaches to the intersection, with LPI's implemented for each crossing to improve pedestrian safety. Based on our analysis, the split phasing is inefficient and causes excessive delay for all four approaches to the intersection. To mitigate the project operations impacts of this configuration, an additional alternative Build 2, changing Trenton Street to a one way westbound, was analyzed. As part of this alternative, it is anticipated that vehicles currently using Trenton Street to access Gano Street would reroute to use Wickenden Street and/or roadways north of Trenton Street.

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Figure 1
Site Location Map
Bridge Group 57T-10: I-195 Washington North Phase 2
Providence & East Providence, RI

Traffic analyses for the two intersections mentioned above have been conducted for four scenarios:

- Existing Conditions;
- Future 2045 No-Build Conditions;
- Future 2045 Build 1 Conditions (Trenton Street remaining as one-way eastbound);
- Future 2045 Build 2 Conditions (Trenton Street converting to one-way westbound).

Both Future 2045 Build Condition analyses are based off of the revised BTC geometry. The results of the Synchro capacity and queue analysis for each of the four scenarios are summarized in Tables 1 and 2 and are attached for reference. In order to provide a conservative analysis for the one-way conversion, all vehicles using Trenton Street to access Gano Street have been added to the Wickenden Street eastbound left and right turn volumes under both 2045 Build 1 and Build 2 Conditions.

Under Future 2045 Build 1 Conditions with Trenton Street remaining as a one-way eastbound roadway, intersection operations at Gano Street and the Trenton Street/I-195 Westbound Ramps are expected to reduce from overall Level-Of-Service (LOS) B under No Build, to overall LOS F during both the weekday morning and weekday afternoon peak hours. As mentioned previously, due to the offset of the I-195 westbound ramps and Trenton Street, the signal would operate with split phasing for all four approaches. With the exception of the westbound right turn lane during the weekday afternoon peak hour, all other movements are expected to operate at LOS F and over capacity during both peak hours; degrading from LOS A or better under No Build conditions for the same peak hours. The eastbound stop-controlled approach at the intersection of Gano Street and Wickenden Street is expected to improve from LOS F under No Build to LOS C during both weekday peak hours analyzed.

As shown in Table 2, queues are expected to increase for the northbound and southbound Gano Street approaches to the Trenton Street/I-195 ramps during both the weekday morning and weekday afternoon peak hours for the 2045 Build 1 Conditions when compared with the No Build Scenario. The 95th percentile queues for the Wickenden Street eastbound approach to Gano Street are expected to be significantly less than No Build, with only one to two vehicles during both weekday morning and afternoon peak hours.

Converting Trenton Street to be a one-way westbound roadway (west of the intersection with Gano Street) would improve intersection operations at Gano Street and the Trenton Street/I-195 Westbound Ramps under 2045 Build 2 Conditions. Split signal phasing is still required for both of the Gano Street approaches; however, converting Trenton Street to one-way westbound will reduce the number of split signal phases from four to three, and improving operations when compared with the 2045 Build 1 Conditions that maintains the current configuration of Trenton Street. The overall LOS is expected to reduce from overall LOS B (No Build) to overall LOS F during the weekday morning peak hour, with the northbound and southbound approaches operating just over capacity; however, with less delay than 2045 Build 1 Conditions. The I-195 Ramps westbound left turn lane, when compared to 2045 Build 1 Conditions, is expected to improve from LOS F to LOS D during the weekday morning peak hour, and from LOS F to LOS E and under capacity for the weekday afternoon peak hour.

During the weekday afternoon peak hour under 2045 Build 2 Conditions, the intersection is expected to reduce from overall LOS B when compared with the 2045 No Build Scenario to LOS E, with all approaches operating at or under capacity. When compared to 2045 Build 1 Conditions, each approach is expected to improve to LOS E or better, with the exception of the westbound right turn lane, which degrades from LOS D to LOS F in the 2045 Build 2 Conditions. Each approach to the intersection (with the exception of the westbound right) is expected to experience significantly less delay than 2045 Build 1 Conditions, and at/under capacity. The eastbound Wickenden Street stop-controlled approach at the intersection with Gano Street is expected to improve from LOS F for both peak periods under No Build Conditions, to LOS E during the weekday morning peak hour, and LOS C during the weekday afternoon peak hour. Compared to the 2045 Build 1 Conditions, the Wickenden Street eastbound approach to Gano Street degrades from LOS C to LOS E during the weekday morning peak hour, with an additional 15 seconds of delay.

As shown in Table 2, the 50th and 95th percentile queue lengths for the intersection of Gano Street and Trenton Street/I-195 Ramps are less than the queue lengths projected under 2045 Build 1 Conditions during both the weekday morning and afternoon peak hours for the 2045 Build 2 Conditions. The queues for the Wickenden Street eastbound approach to Gano Street is expected to be approximately 125 feet during the weekday morning peak hour, which is equivalent to 5 vehicles. This is slightly longer than the 2045 Build 1 Conditions which indicates one vehicle, but significantly better than No Build Conditions. During the weekday afternoon peak hour, minimal queues are expected under 2045 Build 2 Conditions.

Table 1: Capacity Analysis Results

			2019 Existing						2045 No Build					
			Weekday AM			Weekday PM			Weekday AM			Weekday PM		
	Movement		LOS[1]	Delay[2]	V/C[3]	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
Wickenden Street at	EB	LR	F	>50.0	0.98	F	>50.0	0.93	F	>50.0	>1.10	F	>50.0	>1.10
Gano Street	NB	LT	A	1.5	0.14	A	1.9	0.13	A	1.5	0.16	A	2.0	0.15
	SB	TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00
Gano Street at	EB	LTR	A	8.7	0.26	B	16.8	0.46	A	8.4	0.27	B	18.4	0.46
Trenton Street/I-195 Off-Ramp	WB	L	B	19.9	0.12	C	21.4	0.35	C	20.4	0.13	C	23.9	0.49
		R	C	25.0	0.48	C	22.1	0.40	C	27.5	0.55	C	24.6	0.55
	NB	T	B	10.9	0.62	A	7.7	0.44	B	12.3	0.67	A	9.3	0.50
		TR	-	-	-	-	-	-	-	-	-	-	-	-
		LTR	-	-	-	-	-	-	-	-	-	-	-	-
	SB	L	-	-	-	-	-	-	-	-	-	-	-	-
		LT	-	-	-	-	-	-	-	-	-	-	-	-
		LTR	-	-	-	-	-	-	-	-	-	-	-	-
		T	B	15.7	0.79	B	10.9	0.65	B	18.9	0.83	B	16.9	0.78
	Overall		*B*	*14.5*	*0.63*	*B*	*11.9*	*0.62*	*B*	*16.8*	*0.67*	*B*	*16.1*	*0.69*

			2045 Build 1 Trenton One-Way EB						2045 Build 2 Trenton One-Way WB					
			Weekday AM			Weekday PM			Weekday AM			Weekday PM		
	Movement		LOS	Delay	V/C	LOS	Delay	V/C	LOS[1]	Delay[2]	V/C[3]	LOS	Delay	V/C
Wickenden Street at	EB	LR	C	22.1	0.28	C	15.2	0.21	E	36.8	0.70	C	15.2	0.21
Gano Street	NB	LT	A	1.2	0.10	A	1.3	0.07	A	1.0	0.09	A	1.3	0.07
	SB	TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00
Gano Street at	EB	LTR	F	323.8	1.55	F	528.3	2.05	-	-	-	-	-	-
Trenton Street/I-195 Off-Ramp	WB	L	F	114.4	0.69	F	502.3	1.99	D	50.9	0.17	E	67.9	0.84
		R	F	151.5	1.09	D	38.6	0.59	F	104.5	0.94	F	95.8	0.97
	NB	T	-	-	-	-	-	-	-	-	-	-	-	-
		TR	F	80.4	1.01	F	124.7	1.16	-	-	-	-	-	-
		LTR	-	-	-	-	-	-	E	71.6	1.01	E	64.5	1.00
	SB	L	F	107.8	1.07	F	230.4	1.41	F	84.2	1.01	E	62.0	0.96
		LT	F	111.7	1.08	F	225.2	1.40	-	-	-	-	-	-
		LTR	-	-	-	-	-	-	F	88.8	1.03	E	61.6	0.96
		T	-	-	-	-	-	-	-	-	-	-	-	-
	Overall		F	122.6	0.89	F	239.5	0.88	*F*	*82.0*	*0.82*	*E*	*66.6*	*0.79*

[1] Level-Of-Service

[2] Average vehicle delay (seconds)

[3] Volume to capacity ratio

Table 2: Queue Analysis Results

			2019 Existing				2045 No Build			
			Weekday AM		Weekday PM		Weekday AM		Weekday PM	
	Movement		50th Queue[1]	95th Queue[2]	50th Queue	95th Queue	50th Queue	95th Queue	50th Queue	95th Queue
Wickenden Street at	EB	LR	n/a	215	n/a	203	n/a	270	n/a	285
Gano Street	NB	LT	n/a	13	n/a	10	n/a	15	n/a	13
	SB	TR	n/a	0	n/a	0	n/a	0	n/a	0
Gano Street at	EB	LTR	4	30	28	58	5	31	37	69
Trenton Street/I-195 Off-Ramp	WB	L	8	29	24	51	11	32	38	75
		R	43	105	31	63	62	120	51	93
	NB	T	105	230	63	157	134	291	85	189
		TR	-	-	-	-	-	-	-	-
		LTR	-	-	-	-	-	-	-	-
	SB	L	-	-	-	-	-	-	-	-
		LT	-	-	-	-	-	-	-	-
		LTR	-	-	-	-	-	-	-	-
		T	160	355	112	283	203	#521	171	#452

			2045 Build 1 Trenton One-Way EB				2045 Build 2 Trenton One-Way WB			
			Weekday AM		Weekday PM		Weekday AM		Weekday PM	
	Movement		50th Queue	95th Queue	50th Queue	95th Queue	50th Queue	95th Queue	50th Queue	95th Queue
Wickenden Street at	EB	LR	n/a	28	n/a	20	n/a	125	n/a	20
Gano Street	NB	LT	n/a	8	n/a	5	n/a	8	n/a	5
	SB	TR	n/a	0	n/a	0	n/a	0	n/a	0
Gano Street at	EB	LTR	~232	#369	~169	#304	-	-	-	-
Trenton Street/I-195 Off-Ramp	WB	L	32	#105	~140	#285	26	64	94	159
		R	~186	#384	84	165	146	#322	0	48
	NB	T	-	-	-	-	-	-	-	-
		TR	615	#1013	~311	#606	-	-	-	-
		LTR	-	-	-	-	564	#950	314	#584
	SB	L	~521	#858	~330	#621	411	#736	262	#501
		LT	~547	#890	~329	#620	-	-	-	-
		LTR	-	-	-	-	~435	#766	260	#503
		T	-	-	-	-	-	-	-	-

[1] 50th percentile queue (feet)
[2] 95th percentile queue (feet)
n/a Not Applicable

Summary of findings

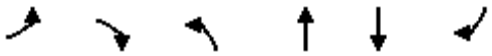
The proposed skewed alignment of the I-195 off-ramp would help to mitigate the potential of wrong way driving, while the proposed islands would help to reduce the crossing lengths spanning the I-195 ramps. However, the geometric changes, while maintaining the current configuration of Trenton Street require that the traffic signal would operate with split phasing for each of the four approaches. The additional traffic signal phase significantly increases the projected vehicle delay for all approaches.

Based on the synchro analysis, it is McMahon's recommendation to convert Trenton Street from a one-way eastbound approach to be a one-way westbound roadway departure. This will allow reducing the number of phases at the signalized intersection from four to three. Based on the revised signal operations, each approach is expected to operate mostly under capacity during both peak periods for the 2045 Build 2 Conditions, with the 50th and 95th percentile queues shorter than with 2045 Build 1 conditions during both the weekday morning and afternoon peak hours. The queue lengths expected for the Wickenden Street eastbound approach to Gano Street is expected to be significantly better than No Build, with approximately 5 vehicles during the weekday peak periods.

In an effort to increase safety for pedestrians, we also recommend providing LPI's to allow pedestrians to enter the intersection prior to vehicles turning, making them more visible to motorists. The results of the traffic analysis include LPI for the pedestrian phases.

ATTACHMENT A

2019 Existing Capacity/Level-of-Service Analysis



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	22	155	88	574	852	55
Future Volume (vph)	22	155	88	574	852	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1631	0	0	1799	1833	0
Flt Permitted	0.994			0.993		
Satd. Flow (perm)	1631	0	0	1799	1833	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.84	0.84	0.87	0.87	0.94	0.94
Heavy Vehicles (%)	10%	1%	4%	5%	3%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	211	0	0	761	965	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 104.0%		ICU Level of Service G	
Analysis Period (min) 15			

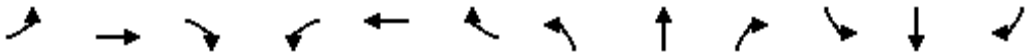
Intersection	
Int Delay, s/veh	11.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	155	88	574	852	55
Future Vol, veh/h	22	155	88	574	852	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	87	87	94	94
Heavy Vehicles, %	10	1	4	5	3	0
Mvmt Flow	26	185	101	660	906	59

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1798	936	965	0	-	0
Stage 1	936	-	-	-	-	-
Stage 2	862	-	-	-	-	-
Critical Hdwy	6.5	6.21	4.14	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	2.236	-	-	-
Pot Cap-1 Maneuver	84	323	706	-	-	-
Stage 1	369	-	-	-	-	-
Stage 2	401	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	65	323	706	-	-	-
Mov Cap-2 Maneuver	65	-	-	-	-	-
Stage 1	286	-	-	-	-	-
Stage 2	401	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	101.9	1.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	706	-	216	-	-
HCM Lane V/C Ratio	0.143	-	0.976	-	-
HCM Control Delay (s)	10.9	0	101.9	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.5	-	8.6	-	-

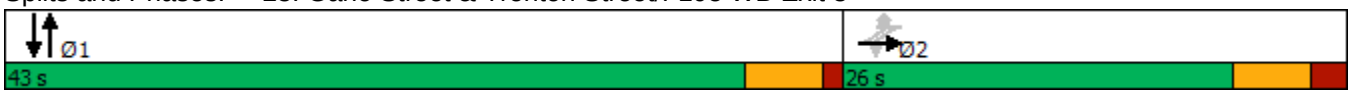


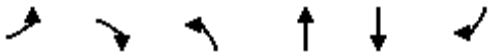
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	0	73	29	0	149	0	590	0	0	795	0
Future Volume (vph)	13	0	73	29	0	149	0	590	0	0	795	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		40	0		0	0		0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1615	0	1805	0	1615	0	1810	0	0	1863	0
Flt Permitted		0.993		0.688								
Satd. Flow (perm)	0	1615	0	1307	0	1615	0	1810	0	0	1863	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		91										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.94	0.94	0.94	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	4%	0%	0%	0%	0%	5%	0%	0%	2%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	107	0	32	0	164	0	628	0	0	820	0
Turn Type	Perm	NA		D.Pm		Perm		NA			NA	
Protected Phases		2						1			1	
Permitted Phases	2			2		2						
Detector Phase	2	2		2		2		1			1	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0		5.0		15.0			15.0	
Minimum Split (s)	21.0	21.0		21.0		21.0		20.0			20.0	
Total Split (s)	26.0	26.0		26.0		26.0		43.0			43.0	
Total Split (%)	37.7%	37.7%		37.7%		37.7%		62.3%			62.3%	
Yellow Time (s)	4.0	4.0		4.0		4.0		4.0			4.0	
All-Red Time (s)	2.0	2.0		2.0		2.0		1.0			1.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0			0.0	
Total Lost Time (s)		6.0		6.0		6.0		5.0			5.0	
Lead/Lag	Lag	Lag		Lag		Lag		Lead			Lead	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes			Yes	
Recall Mode	Min	Min		Min		Min		None			None	
Act Effct Green (s)		10.6		10.6		10.6		28.0			28.0	
Actuated g/C Ratio		0.21		0.21		0.21		0.56			0.56	
v/c Ratio		0.26		0.12		0.48		0.62			0.79	
Control Delay		8.7		19.9		25.0		10.9			15.7	
Queue Delay		0.0		0.0		0.0		0.0			0.0	
Total Delay		8.7		19.9		25.0		10.9			15.7	
LOS		A		B		C		B			B	
Approach Delay		8.7			24.2			10.9			15.7	
Approach LOS		A			C			B			B	
Queue Length 50th (ft)		4		8		43		105			160	
Queue Length 95th (ft)		30		29		105		230			355	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)						40						
Base Capacity (vph)		737		554		684		1394			1435	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0		0		0		0			0	
Spillback Cap Reductn		0		0		0		0			0	
Storage Cap Reductn		0		0		0		0			0	
Reduced v/c Ratio		0.15		0.06		0.24		0.45			0.57	

Intersection Summary			
Area Type:	Other		
Cycle Length: 69			
Actuated Cycle Length: 50.3			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 62.9%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 3





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	33	141	89	425	827	85
Future Volume (vph)	33	141	89	425	827	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1664	0	0	1883	1857	0
Flt Permitted	0.991			0.991		
Satd. Flow (perm)	1664	0	0	1883	1857	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.80	0.80	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	217	0	0	541	960	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 96.5%		ICU Level of Service F	
Analysis Period (min) 15			

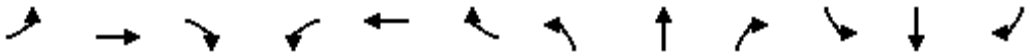
Intersection	
Int Delay, s/veh	11.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	33	141	89	425	827	85
Future Vol, veh/h	33	141	89	425	827	85
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	1
Mvmt Flow	41	176	94	447	871	89

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1551	916	960	0	-	0
Stage 1	916	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Critical Hdwy	6.4	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	126	331	725	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	104	331	725	-	-	-
Mov Cap-2 Maneuver	104	-	-	-	-	-
Stage 1	325	-	-	-	-	-
Stage 2	532	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	86.3	1.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	725	-	234	-	-
HCM Lane V/C Ratio	0.129	-	0.929	-	-
HCM Control Delay (s)	10.7	0	86.3	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.4	-	8.1	-	-

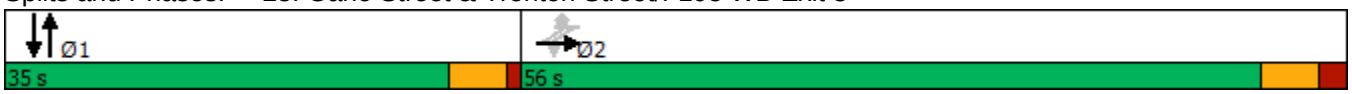


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	0	103	77	0	100	0	453	0	0	723	0
Future Volume (vph)	26	0	103	77	0	100	0	453	0	0	723	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		40	0		0	0		0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1678	0	1805	0	1615	0	1881	0	0	1881	0
Flt Permitted		0.990		0.764								
Satd. Flow (perm)	0	1678	0	1452	0	1615	0	1881	0	0	1881	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		56										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	162	0	91	0	118	0	492	0	0	730	0
Turn Type	Perm	NA		D.Pm		Perm		NA			NA	
Protected Phases		2						1			1	
Permitted Phases	2			2		2						
Detector Phase	2	2		2		2		1			1	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0		5.0		15.0			15.0	
Minimum Split (s)	21.0	21.0		21.0		21.0		20.0			20.0	
Total Split (s)	56.0	56.0		56.0		56.0		35.0			35.0	
Total Split (%)	61.5%	61.5%		61.5%		61.5%		38.5%			38.5%	
Yellow Time (s)	4.0	4.0		4.0		4.0		4.0			4.0	
All-Red Time (s)	2.0	2.0		2.0		2.0		1.0			1.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0			0.0	
Total Lost Time (s)		6.0		6.0		6.0		5.0			5.0	
Lead/Lag	Lag	Lag		Lag		Lag		Lead			Lead	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes			Yes	
Recall Mode	Min	Min		Min		Min		None			None	
Act Effct Green (s)		9.1		9.1		9.1		30.1			30.1	
Actuated g/C Ratio		0.18		0.18		0.18		0.60			0.60	
v/c Ratio		0.46		0.35		0.40		0.44			0.65	
Control Delay		16.8		21.4		22.1		7.7			10.9	
Queue Delay		0.0		0.0		0.0		0.0			0.0	
Total Delay		16.8		21.4		22.1		7.7			10.9	
LOS		B		C		C		A			B	
Approach Delay		16.8			21.8			7.7			10.9	
Approach LOS		B			C			A			B	
Queue Length 50th (ft)		28		24		31		63			112	
Queue Length 95th (ft)		58		51		63		157			283	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)						40						
Base Capacity (vph)		1674		1448		1611		1126			1126	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0		0		0		0			0	
Spillback Cap Reductn		0		0		0		0			0	
Storage Cap Reductn		0		0		0		0			0	
Reduced v/c Ratio		0.10		0.06		0.07		0.44			0.65	

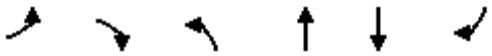
Intersection Summary			
Area Type:	Other		
Cycle Length: 91			
Actuated Cycle Length: 50.3			
Natural Cycle: 55			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 61.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 3



APPENDIX B

2045 No Build Capacity/Level-of-Service Analysis



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	23	160	92	594	890	84
Future Volume (vph)	23	160	92	594	890	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1631	0	0	1799	1827	0
Flt Permitted	0.994			0.993		
Satd. Flow (perm)	1631	0	0	1799	1827	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.84	0.84	0.87	0.87	0.94	0.94
Heavy Vehicles (%)	10%	1%	4%	5%	3%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	217	0	0	789	1036	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 109.4%		ICU Level of Service H	
Analysis Period (min) 15			

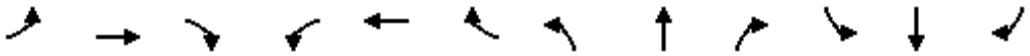
Intersection	
Int Delay, s/veh	17.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	160	92	594	890	84
Future Vol, veh/h	23	160	92	594	890	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	87	87	94	94
Heavy Vehicles, %	10	1	4	5	3	0
Mvmt Flow	27	190	106	683	947	89

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1887	992	1036	0	-	0
Stage 1	992	-	-	-	-	-
Stage 2	895	-	-	-	-	-
Critical Hdwy	6.5	6.21	4.14	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	2.236	-	-	-
Pot Cap-1 Maneuver	74	300	663	-	-	-
Stage 1	347	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	55	300	663	-	-	-
Mov Cap-2 Maneuver	55	-	-	-	-	-
Stage 1	257	-	-	-	-	-
Stage 2	386	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	156.5	1.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	663	-	192	-	-
HCM Lane V/C Ratio	0.159	-	1.135	-	-
HCM Control Delay (s)	11.5	0	156.5	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.6	-	10.8	-	-



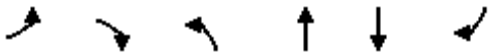
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	0	78	34	0	174	0	655	0	0	866	0
Future Volume (vph)	13	0	78	34	0	174	0	655	0	0	866	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		40	0		0	0		0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1612	0	1805	0	1615	0	1810	0	0	1863	0
Flt Permitted		0.993		0.684								
Satd. Flow (perm)	0	1612	0	1300	0	1615	0	1810	0	0	1863	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		98										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.94	0.94	0.94	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	4%	0%	0%	0%	0%	5%	0%	0%	2%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	0	37	0	191	0	697	0	0	893	0
Turn Type	Perm	NA		D.Pm		Perm		NA			NA	
Protected Phases		2						1			1	
Permitted Phases	2			2		2						
Detector Phase	2	2		2		2		1			1	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0		5.0		15.0			15.0	
Minimum Split (s)	21.0	21.0		21.0		21.0		20.0			20.0	
Total Split (s)	26.0	26.0		26.0		26.0		43.0			43.0	
Total Split (%)	37.7%	37.7%		37.7%		37.7%		62.3%			62.3%	
Yellow Time (s)	4.0	4.0		4.0		4.0		4.0			4.0	
All-Red Time (s)	2.0	2.0		2.0		2.0		1.0			1.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0			0.0	
Total Lost Time (s)		6.0		6.0		6.0		5.0			5.0	
Lead/Lag	Lag	Lag		Lag		Lag		Lead			Lead	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes			Yes	
Recall Mode	Min	Min		Min		Min		None			None	
Act Effct Green (s)		11.7		11.7		11.7		31.6			31.6	
Actuated g/C Ratio		0.21		0.21		0.21		0.58			0.58	
v/c Ratio		0.27		0.13		0.55		0.67			0.83	
Control Delay		8.4		20.4		27.5		12.3			18.9	
Queue Delay		0.0		0.0		0.0		0.0			0.0	
Total Delay		8.4		20.4		27.5		12.3			18.9	
LOS		A		C		C		B			B	
Approach Delay		8.4			26.3			12.3			18.9	
Approach LOS		A			C			B			B	
Queue Length 50th (ft)		5		11		62		134			203	
Queue Length 95th (ft)		31		32		120		291			#521	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)						40						
Base Capacity (vph)		675		495		616		1303			1341	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0		0		0		0			0	
Spillback Cap Reductn		0		0		0		0			0	
Storage Cap Reductn		0		0		0		0			0	
Reduced v/c Ratio		0.17		0.07		0.31		0.53			0.67	

Intersection Summary			
Area Type:	Other		
Cycle Length: 69			
Actuated Cycle Length: 54.9			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 16.8		Intersection LOS: B	
Intersection Capacity Utilization 66.9%		ICU Level of Service C	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 3



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	145	91	438	923	137
Future Volume (vph)	34	145	91	438	923	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1663	0	0	1883	1849	0
Flt Permitted	0.990			0.991		
Satd. Flow (perm)	1663	0	0	1883	1849	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.80	0.80	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	224	0	0	557	1116	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 105.8%		ICU Level of Service G	
Analysis Period (min) 15			

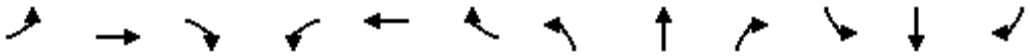
Intersection	
Int Delay, s/veh	20.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	34	145	91	438	923	137
Future Vol, veh/h	34	145	91	438	923	137
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	1
Mvmt Flow	43	181	96	461	972	144

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1697	1044	1116	0	-	0
Stage 1	1044	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Critical Hdwy	6.4	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	103	279	633	-	-	-
Stage 1	342	-	-	-	-	-
Stage 2	522	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	82	279	633	-	-	-
Mov Cap-2 Maneuver	82	-	-	-	-	-
Stage 1	272	-	-	-	-	-
Stage 2	522	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	166.9	2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	633	-	192	-	-
HCM Lane V/C Ratio	0.151	-	1.165	-	-
HCM Control Delay (s)	11.7	0	166.9	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.5	-	11.4	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	0	110	120	0	157	0	504	0	0	844	0
Future Volume (vph)	27	0	110	120	0	157	0	504	0	0	844	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		40	0		0	0		0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1678	0	1805	0	1615	0	1881	0	0	1881	0
Flt Permitted		0.990		0.728								
Satd. Flow (perm)	0	1678	0	1383	0	1615	0	1881	0	0	1881	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		33										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	172	0	141	0	185	0	548	0	0	853	0
Turn Type	Perm	NA		D.Pm		Perm		NA			NA	
Protected Phases		2						1			1	
Permitted Phases	2			2		2						
Detector Phase	2	2		2		2		1			1	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0		5.0		15.0			15.0	
Minimum Split (s)	21.0	21.0		21.0		21.0		20.0			20.0	
Total Split (s)	56.0	56.0		56.0		56.0		35.0			35.0	
Total Split (%)	61.5%	61.5%		61.5%		61.5%		38.5%			38.5%	
Yellow Time (s)	4.0	4.0		4.0		4.0		4.0			4.0	
All-Red Time (s)	2.0	2.0		2.0		2.0		1.0			1.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0			0.0	
Total Lost Time (s)		6.0		6.0		6.0		5.0			5.0	
Lead/Lag	Lag	Lag		Lag		Lag		Lead			Lead	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes			Yes	
Recall Mode	Min	Min		Min		Min		None			None	
Act Effct Green (s)		10.9		10.9		10.9		30.1			30.1	
Actuated g/C Ratio		0.21		0.21		0.21		0.58			0.58	
v/c Ratio		0.46		0.49		0.55		0.50			0.78	
Control Delay		18.4		23.9		24.6		9.3			16.9	
Queue Delay		0.0		0.0		0.0		0.0			0.0	
Total Delay		18.4		23.9		24.6		9.3			16.9	
LOS		B		C		C		A			B	
Approach Delay		18.4			24.3			9.3			16.9	
Approach LOS		B			C			A			B	
Queue Length 50th (ft)		37		38		51		85			171	
Queue Length 95th (ft)		69		75		93		189			#452	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)						40						
Base Capacity (vph)		1606		1322		1544		1087			1087	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0		0		0		0			0	
Spillback Cap Reductn		0		0		0		0			0	
Storage Cap Reductn		0		0		0		0			0	
Reduced v/c Ratio		0.11		0.11		0.12		0.50			0.78	

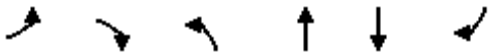
Intersection Summary			
Area Type:	Other		
Cycle Length: 91			
Actuated Cycle Length: 52			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 68.5%		ICU Level of Service C	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 3

ATTACHMENT C

2045 Build Capacity/Level-of-Service Analysis



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	27	41	91	608	158	323
Future Volume (vph)	27	41	91	608	158	323
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1637	0	0	1801	1710	0
Flt Permitted	0.981			0.994		
Satd. Flow (perm)	1637	0	0	1801	1710	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.84	0.84	0.87	0.87	0.94	0.94
Heavy Vehicles (%)	10%	1%	4%	5%	3%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	0	0	804	512	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 79.2%		ICU Level of Service D	
Analysis Period (min) 15			

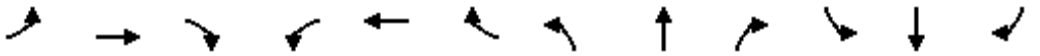
Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	27	41	91	608	158	323
Future Vol, veh/h	27	41	91	608	158	323
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	87	87	94	94
Heavy Vehicles, %	10	1	4	5	3	0
Mvmt Flow	32	49	105	699	168	344

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1249	340	512	0	-	0
Stage 1	340	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Critical Hdwy	6.5	6.21	4.14	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.309	2.236	-	-	-
Pot Cap-1 Maneuver	184	705	1043	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	380	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	154	705	1043	-	-	-
Mov Cap-2 Maneuver	154	-	-	-	-	-
Stage 1	587	-	-	-	-	-
Stage 2	380	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.1	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1043	-	291	-	-
HCM Lane V/C Ratio	0.1	-	0.278	-	-
HCM Control Delay (s)	8.8	0	22.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.3	-	1.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	41	93	34	0	174	0	653	2	645	367	0
Future Volume (vph)	16	41	93	34	0	174	0	653	2	645	367	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	85		0	0		0	400		0
Storage Lanes	0		0	1		1	0		0	1		0
Taper Length (ft)	25			75			25			25		
Satd. Flow (prot)	0	1690	0	1805	0	1615	0	1810	0	1715	1755	0
Flt Permitted		0.995		0.267						0.950	0.986	
Satd. Flow (perm)	0	1690	0	507	0	1615	0	1810	0	1715	1755	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.92	0.92	0.92	0.94	0.94	0.94	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	4%	0%	0%	0%	0%	5%	0%	0%	2%	0%
Shared Lane Traffic (%)										23%		
Lane Group Flow (vph)	0	187	0	37	0	189	0	697	0	512	531	0
Turn Type	Split	NA		Perm		Perm		NA		Split	NA	
Protected Phases	5	5						2		1	1	
Permitted Phases				4		4						
Detector Phase	5	5		4		4		2		1	1	
Switch Phase												
Minimum Initial (s)	5.0	5.0		10.0		10.0		15.0		15.0	15.0	
Minimum Split (s)	9.0	9.0		21.0		21.0		21.0		23.0	23.0	
Total Split (s)	14.0	14.0		21.0		21.0		58.0		44.0	44.0	
Total Split (%)	9.3%	9.3%		14.0%		14.0%		38.7%		29.3%	29.3%	
Yellow Time (s)	3.0	3.0		4.0		4.0		3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		2.0		2.0		2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0		0.0	0.0	
Total Lost Time (s)		4.0		6.0		6.0		5.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag		Lag				Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes				Yes	Yes	
Recall Mode	None	None		None		None		None		Min	Min	
Act Effct Green (s)		10.0		15.0		15.0		53.1		39.1	39.1	
Actuated g/C Ratio		0.07		0.11		0.11		0.38		0.28	0.28	
v/c Ratio		1.55		0.69		1.09		1.01		1.07	1.08	
Control Delay		323.8		114.4		151.5		80.4		107.8	111.7	
Queue Delay		0.0		0.0		0.0		0.0		0.0	0.0	
Total Delay		323.8		114.4		151.5		80.4		107.8	111.7	
LOS		F		F		F		F		F	F	
Approach Delay		323.8			145.4			80.4			109.8	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~232		32		~186		615		~521	~547	
Queue Length 95th (ft)		#369		#105		#384		#1013		#858	#890	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)				85						400		
Base Capacity (vph)		121		54		173		688		479	490	

Lane Group	Ø3	Ø9	Ø10
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	3	9	10
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	4.0	4.0	5.0
Total Split (s)	4.0	4.0	5.0
Total Split (%)	3%	3%	3%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	1.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Recall Mode	None	None	None
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0		0		0		0		0	0	
Spillback Cap Reductn		0		0		0		0		0	0	
Storage Cap Reductn		0		0		0		0		0	0	
Reduced v/c Ratio		1.55		0.69		1.09		1.01		1.07	1.08	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 139.6			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.55			
Intersection Signal Delay: 122.6		Intersection LOS: F	
Intersection Capacity Utilization 89.1%		ICU Level of Service E	
Analysis Period (min) 15			

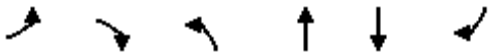
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 1D

Lane Group	Ø3	Ø9	Ø10
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	38	37	91	458	71	179
Future Volume (vph)	38	37	91	458	71	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1722	0	0	1885	1699	0
Flt Permitted	0.975			0.992		
Satd. Flow (perm)	1722	0	0	1885	1699	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.80	0.80	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	94	0	0	578	263	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.3%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	37	91	458	71	179
Future Vol, veh/h	38	37	91	458	71	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	1
Mvmt Flow	48	46	96	482	75	188

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	843	169	263	0	-	0
Stage 1	169	-	-	-	-	-
Stage 2	674	-	-	-	-	-
Critical Hdwy	6.4	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	337	878	1313	-	-	-
Stage 1	866	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	303	878	1313	-	-	-
Mov Cap-2 Maneuver	303	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	510	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.2	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1313	-	448	-	-
HCM Lane V/C Ratio	0.073	-	0.209	-	-
HCM Control Delay (s)	8	0	15.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.8	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	41	110	159	0	164	0	504	3	895	71	0
Future Volume (vph)	27	41	110	159	0	164	0	504	3	895	71	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	85		0	0		0	400		0
Storage Lanes	0		0	1		1	0		0	1		0
Taper Length (ft)	25			75			25			25		
Satd. Flow (prot)	0	1726	0	1805	0	1615	0	1879	0	1715	1728	0
Flt Permitted		0.992		0.248						0.950	0.959	
Satd. Flow (perm)	0	1726	0	471	0	1615	0	1879	0	1715	1728	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)										46%		
Lane Group Flow (vph)	0	223	0	187	0	193	0	551	0	488	488	0
Turn Type	Split	NA		Perm		Perm		NA		Split	NA	
Protected Phases	5	5						2		1	1	
Permitted Phases				4		4						
Detector Phase	5	5		4		4		2		1	1	
Switch Phase												
Minimum Initial (s)	5.0	5.0		10.0		10.0		15.0		15.0	15.0	
Minimum Split (s)	9.0	9.0		21.0		21.0		23.0		20.0	20.0	
Total Split (s)	9.0	9.0		22.0		22.0		25.0		21.0	21.0	
Total Split (%)	10.0%	10.0%		24.4%		24.4%		27.8%		23.3%	23.3%	
Yellow Time (s)	3.0	3.0		4.0		4.0		3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		2.0		2.0		2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0		0.0	0.0	
Total Lost Time (s)		4.0		6.0		6.0		5.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag		Lag				Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes				Yes	Yes	
Recall Mode	None	None		None		None		None		Min	Min	
Act Effct Green (s)		5.0		16.1		16.1		20.1		16.1	16.1	
Actuated g/C Ratio		0.06		0.20		0.20		0.25		0.20	0.20	
v/c Ratio		2.05		1.99		0.59		1.16		1.41	1.40	
Control Delay		528.3		502.3		38.6		124.7		230.4	225.2	
Queue Delay		0.0		0.0		0.0		0.0		0.0	0.0	
Total Delay		528.3		502.3		38.6		124.7		230.4	225.2	
LOS		F		F		D		F		F	F	
Approach Delay		528.3			266.8			124.7			227.8	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~169		~140		84		~311		~330	~329	
Queue Length 95th (ft)		#304		#285		165		#606		#621	#620	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)				85						400		
Base Capacity (vph)		109		94		325		474		346	349	

Lane Group	Ø3	Ø9	Ø10
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	3	9	10
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	4.0	4.0	5.0
Total Split (s)	4.0	4.0	5.0
Total Split (%)	4%	4%	6%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	1.0	1.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Recall Mode	None	None	None
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			

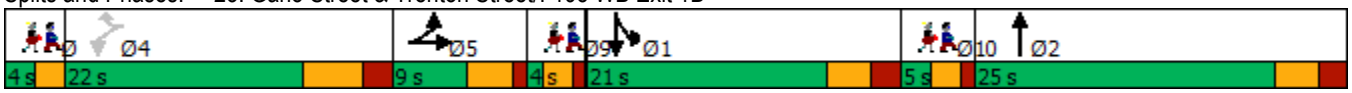
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0		0		0		0		0	0	
Spillback Cap Reductn		0		0		0		0		0	0	
Storage Cap Reductn		0		0		0		0		0	0	
Reduced v/c Ratio		2.05		1.99		0.59		1.16		1.41	1.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 79.6			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 2.05			
Intersection Signal Delay: 239.5		Intersection LOS: F	
Intersection Capacity Utilization 87.6%		ICU Level of Service E	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

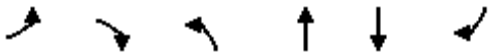
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 1D



Lane Group	Ø3	Ø9	Ø10
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	134	82	617	158	291
Future Volume (vph)	68	134	82	617	158	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1661	0	0	1803	1715	0
Flt Permitted	0.983			0.994		
Satd. Flow (perm)	1661	0	0	1803	1715	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.84	0.84	0.87	0.87	0.94	0.94
Heavy Vehicles (%)	3%	2%	3%	5%	3%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	241	0	0	803	478	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 85.2%		ICU Level of Service E	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	134	82	617	158	291
Future Vol, veh/h	68	134	82	617	158	291
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	87	87	94	94
Heavy Vehicles, %	3	2	3	5	3	0
Mvmt Flow	81	160	94	709	168	310

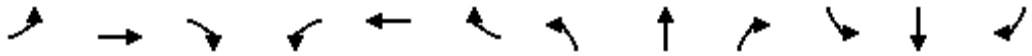
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1220	323	478	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	897	-	-	-	-	-
Critical Hdwy	6.43	6.22	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.318	2.227	-	-	-
Pot Cap-1 Maneuver	198	718	1079	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	718	1079	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	627	-	-	-	-	-
Stage 2	397	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	36.8	1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1079	-	343	-	-
HCM Lane V/C Ratio	0.087	-	0.701	-	-
HCM Control Delay (s)	8.7	0	36.8	-	-
HCM Lane LOS	A	A	E	-	-
HCM 95th %tile Q(veh)	0.3	-	5	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	34	0	174	9	653	43	645	335	32
Future Volume (vph)	0	0	0	34	0	174	9	653	43	645	335	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	85		0	0		0	400		0
Storage Lanes	0		0	1		1	0		0	1		0
Taper Length (ft)	25			75			25			25		
Satd. Flow (prot)	0	0	0	1805	0	1615	0	1800	0	1715	1741	0
Flt Permitted				0.950				0.999		0.950	0.986	
Satd. Flow (perm)	0	0	0	1805	0	1615	0	1800	0	1715	1741	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.92	0.92	0.92	0.94	0.94	0.94	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	2%	0%
Shared Lane Traffic (%)										23%		
Lane Group Flow (vph)	0	0	0	37	0	189	0	751	0	512	531	0
Turn Type				Perm		Perm	Split	NA		Split	NA	
Protected Phases							2	2		1	1	
Permitted Phases				4		4						
Detector Phase				4		4	2	2		1	1	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	15.0		15.0	15.0	
Minimum Split (s)				21.0		21.0	21.0	21.0		23.0	23.0	
Total Split (s)				21.0		21.0	56.0	56.0		42.0	42.0	
Total Split (%)				16.2%		16.2%	43.1%	43.1%		32.3%	32.3%	
Yellow Time (s)				3.5		3.5	3.0	3.0		3.0	3.0	
All-Red Time (s)				2.5		2.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)				0.0		0.0		0.0		0.0	0.0	
Total Lost Time (s)				6.0		6.0		6.0		6.0	6.0	
Lead/Lag				Lag		Lag	Lag	Lag		Lag	Lag	
Lead-Lag Optimize?				Yes		Yes	Yes	Yes		Yes	Yes	
Recall Mode				None		None	None	None		Min	Min	
Act Effct Green (s)				15.0		15.0		50.1		36.0	36.0	
Actuated g/C Ratio				0.12		0.12		0.41		0.30	0.30	
v/c Ratio				0.17		0.94		1.01		1.01	1.03	
Control Delay				50.9		104.5		71.6		84.2	88.8	
Queue Delay				0.0		0.0		0.0		0.0	0.0	
Total Delay				50.9		104.5		71.6		84.2	88.8	
LOS				D		F		E		F	F	
Approach Delay					95.7			71.6			86.5	
Approach LOS					F			E			F	
Queue Length 50th (ft)				26		146		564		411	~435	
Queue Length 95th (ft)				64		#322		#950		#736	#766	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)				85						400		
Base Capacity (vph)				223		200		743		509	517	

Lane Group	Ø3	Ø9	Ø10
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	3	9	10
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	4.0	3.0	4.0
Total Split (s)	4.0	3.0	4.0
Total Split (%)	3%	2%	3%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes
Recall Mode	None	None	None
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn				0		0		0		0	0	
Spillback Cap Reductn				0		0		0		0	0	
Storage Cap Reductn				0		0		0		0	0	
Reduced v/c Ratio				0.17		0.94		1.01		1.01	1.03	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 121.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.03			
Intersection Signal Delay: 82.0		Intersection LOS: F	
Intersection Capacity Utilization 81.8%		ICU Level of Service D	
Analysis Period (min) 15			

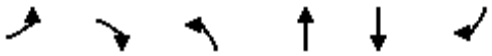
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 1D

Lane Group	Ø3	Ø9	Ø10
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	38	37	91	458	71	179
Future Volume (vph)	38	37	91	458	71	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1730	0	0	1885	1699	0
Flt Permitted	0.975			0.992		
Satd. Flow (perm)	1730	0	0	1885	1699	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	593			272	255	
Travel Time (s)	13.5			6.2	5.8	
Peak Hour Factor	0.80	0.80	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	94	0	0	578	263	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.3%		ICU Level of Service B	
Analysis Period (min) 15			

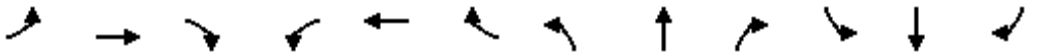
Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	37	91	458	71	179
Future Vol, veh/h	38	37	91	458	71	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	95	95	95	95
Heavy Vehicles, %	0	0	0	0	1	1
Mvmt Flow	48	46	96	482	75	188

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	843	169	263	0	-	0
Stage 1	169	-	-	-	-	-
Stage 2	674	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	337	880	1313	-	-	-
Stage 1	866	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	303	880	1313	-	-	-
Mov Cap-2 Maneuver	303	-	-	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	510	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.2	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1313	-	448	-	-
HCM Lane V/C Ratio	0.073	-	0.209	-	-
HCM Control Delay (s)	8	0	15.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.8	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	159	0	164	18	504	44	895	53	18
Future Volume (vph)	0	0	0	159	0	164	18	504	44	895	53	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	85		0	0		0	400		0
Storage Lanes	0		0	1		1	0		0	1		0
Taper Length (ft)	25			75			25			25		
Satd. Flow (prot)	0	0	0	1805	0	1615	0	1859	0	1715	1719	0
Flt Permitted				0.950				0.998		0.950	0.959	
Satd. Flow (perm)	0	0	0	1805	0	1615	0	1859	0	1715	1719	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			366			255			1998	
Travel Time (s)		8.8			8.3			5.8			45.4	
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.92	0.92	0.92	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)										46%		
Lane Group Flow (vph)	0	0	0	187	0	193	0	616	0	488	488	0
Turn Type				Perm		Perm	Split	NA		Split	NA	
Protected Phases							2	2		1	1	
Permitted Phases				4		4						
Detector Phase				4		4	2	2		1	1	
Switch Phase												
Minimum Initial (s)				10.0		10.0	10.0	10.0		15.0	15.0	
Minimum Split (s)				16.0		16.0	32.0	32.0		21.0	21.0	
Total Split (s)				16.0		16.0	33.0	33.0		30.0	30.0	
Total Split (%)				17.8%		17.8%	36.7%	36.7%		33.3%	33.3%	
Yellow Time (s)				3.5		3.5	3.0	3.0		3.0	3.0	
All-Red Time (s)				2.5		2.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)				0.0		0.0		0.0		0.0	0.0	
Total Lost Time (s)				6.0		6.0		6.0		6.0	6.0	
Lead/Lag				Lag		Lag	Lag	Lag		Lag	Lag	
Lead-Lag Optimize?				Yes		Yes	Yes	Yes		Yes	Yes	
Recall Mode				None		None	None	None		Min	Min	
Act Effct Green (s)				10.0		10.0		27.1		24.1	24.1	
Actuated g/C Ratio				0.12		0.12		0.33		0.30	0.30	
v/c Ratio				0.84		0.97		1.00		0.96	0.96	
Control Delay				67.9		95.8		64.5		62.0	61.6	
Queue Delay				0.0		0.0		0.0		0.0	0.0	
Total Delay				67.9		95.8		64.5		62.0	61.6	
LOS				E		F		E		E	E	
Approach Delay					82.1			64.5			61.8	
Approach LOS					F			E			E	
Queue Length 50th (ft)				91		96		294		244	244	
Queue Length 95th (ft)				#215		#236		#607		#525	#524	
Internal Link Dist (ft)		309			286			175			1918	
Turn Bay Length (ft)				85						400		
Base Capacity (vph)				222		199		619		508	509	

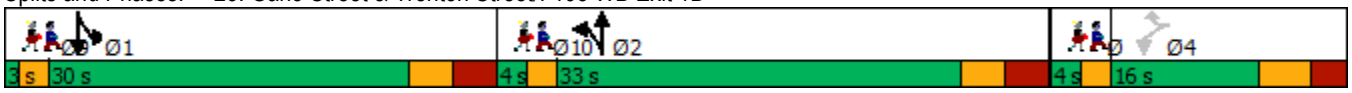
Lane Group	Ø3	Ø9	Ø10
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	3	9	10
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	4.0	3.0	4.0
Total Split (s)	4.0	3.0	4.0
Total Split (%)	4%	3%	4%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes
Recall Mode	None	None	None
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn				0		0		0		0	0	
Spillback Cap Reductn				0		0		0		0	0	
Storage Cap Reductn				0		0		0		0	0	
Reduced v/c Ratio				0.84		0.97		1.00		0.96	0.96	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 81.2			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 66.6		Intersection LOS: E	
Intersection Capacity Utilization 79.1%		ICU Level of Service D	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 23: Gano Street & Trenton Street/I-195 WB Exit 1D



Lane Group	Ø3	Ø9	Ø10
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

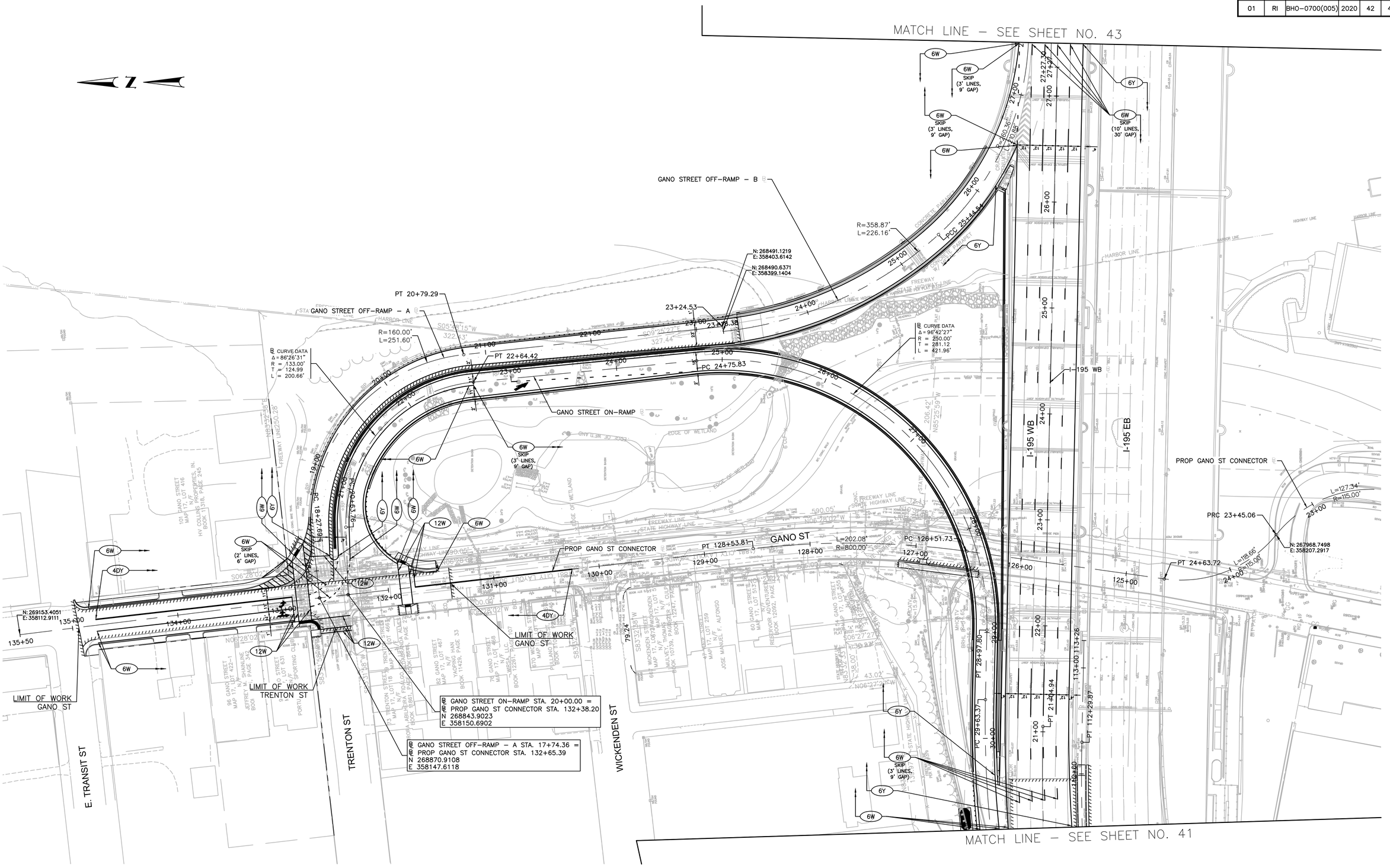
Intersection Summary

APPENDIX D

Gano Street at Trenton Street/I-195 WB Off-Ramp

Original BTC

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
01	RI	BHO-0700(005)	2020	42	47



AECOM

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

DESIGNED BY:	KM
CHECKED BY:	GS
DATE:	4/23/2020
SHEET:	42
OF:	47

SCALE: 1"=40'

GRAPHIC SCALE

REVISIONS			REVISIONS		
NO.	DATE	BY	NO.	DATE	BY

BRIDGE GROUP 57T-10

I-195 WASHINGTON NORTH PHASE 2

PROVIDENCE EAST PROVIDENCE

CONTRACT -- VOLUME: 4 RHODE ISLAND

STRIPING PLAN - 3 OF 8

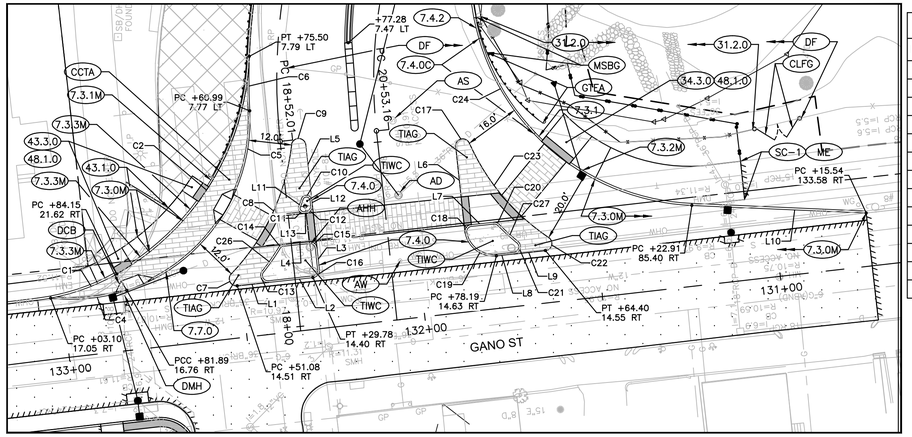
57T-10_V4_011_STRP.DWG

APPENDIX E

Gano Street at Trenton Street/I-195 WB Off-Ramp

Revised BTC

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
01	RI	BHO-0700-006	2021	32	81



LINE TABLE		
LINE #	LENGTH	DIRECTION
L1	21.296	N06° 12' 07.06"W
L2	12.476	S06° 12' 07.06"E
L3	6.091	S83° 47' 52.94"W
L4	7.138	S06° 01' 48.19"E
L5	35.071	S83° 47' 52.94"W
L6	23.437	N83° 47' 52.94"E
L7	6.144	S06° 01' 48.19"E
L8	4.976	N06° 12' 07.06"W
L9	13.796	N06° 12' 07.06"W
L10	48.746	N02° 29' 54.88"E
L11	2.164	S70° 14' 46.80"E
L12	1.490	S83° 47' 52.94"W
L13	0.496	N06° 03' 17.35"W

CURVE TABLE		
CURVE #	RADIUS	LENGTH
C1	60.00	19.75
C2	73.00	74.39
C3	167.68	239.17
C4	50.00	21.55
C5	50.00	65.38
C6	195.83	15.22
C7	1.99	4.90
C8	62.00	40.46
C9	2.00	5.84
C10	1.51	4.02
C11	1.50	3.06
C12	2.00	3.12
C13	2.00	4.69
C14	2.00	1.83
C15	2.01	3.14

CURVE TABLE		
CURVE #	RADIUS	LENGTH
C16	2.00	3.14
C17	2.00	5.67
C18	2.00	3.33
C19	8.00	11.85
C20	2.00	1.79
C21	2.00	4.69
C22	2.00	4.89
C23	62.00	34.90
C24	65.00	139.22
C25	119.56	99.89
C26	68.00	7.88
C27	68.00	7.06

INSET "A"
SCALE: 1" = 20'

MATCH LINE – SEE GENERAL PLAN SHEET NO. 33

MATCH LINE – SEE GENERAL PLAN SHEET NO. 31

SEEKONK RIVER

KEY MAP
NOT TO SCALE

WASHINGTON BRIDGE REHABILITATION AND WIDENING (SEE VOLUME 1 PLANS)

WASHINGTON BRIDGE REHABILITATION AND WIDENING (SEE VOLUME 1 PLANS FOR WORK LIMITS AND DETAILS)

LIMIT OF WORK
VOLUME 1 PLANS

GANO S OFF-RAMP – B
N: 268491.1219
E: 358403.6142
N: 268490.0586
E: 358399.1241

R=358.87'
L=226.16'

PCC 25+44.54

N: 268181.3600
E: 358648.5875
N: 268175.3612
E: 358648.4581

27+27.30

R=260.36'
L=210.88'

+41.47
12.62 LT

RRMT

EDGE OF RIVER

HARBOR LINE

FREEWAY
STATE HIGHWAY LINE

NEW GANO ST OFF-RAMP – A

℄ CURVE DATA
Δ = 90°01'05"
R = 160.10'
T = 160.15
L = 251.53'

PT 21+03.55

S06°11'02"E
215.15'

GANO ST OFF-RAMP (RAMP R)

℄ CURVE DATA
Δ = 96°42'27"
R = 250.00'
T = 281.12
L = 421.96'

23+18.38
+33.18
13.65 RT

25+90.32
110.00 LT

PC 24+49.18

PROP. GANO ST ON-RAMP

S05°28'33"E
185.41'

PT 22+63.76

+90.32
12.00 RT

GANO ST ON-RAMP

PT STA +72.27
169.92 RT

PCC STA +60.65
129.92 RT

SEE NOTE NO. 1

SEE NOTE NO. 2

SEE INSET "A"

PROPOSED BRIDGE NO. 126601
STA 24+90.73 TO STA 28+80.44
(SEE VOLUME 2 PLANS)

SEE NOTE 2 ON SHEET NO. 5

100 YEAR FLOOD BOUNDARY

SHARED USE PATH

I-195 WB

I-195 EB

S88°45'41"E
622.36'

S88°46'09"E
702.82'

PROP GANO ST CONNECTOR

L=127.34'
R=115.00'

PRC 23+45.06

PT 24+63.72

STA. AHEAD = 125+00.00
STA. BACK = 25+00.00

N07°58'19"E
188.02'

N: 267968.7498
E: 358207.2917

CRMC 200' JURISDICTIONAL LIMIT

GANO ST

PT 128+53.81

L=202.08'
R=800.00'

PC 126+51.73

N06°30'02"W
446.20'

PROP GANO ST CONNECTOR

LIMIT OF WORK
GANO ST

LIMIT OF WORK
TRENTON ST

WICKENDEN ST

WADE ST

E. TRANSIT ST

TRENTON ST

N: 269153.4051
E: 358112.9111

N07°04'21"W
250.00'

GANO ST ON-RAMP STA. 20+00.00 =
PROP GANO ST CONNECTOR STA. 132+07.81
N 268813.7076
E 358154.1300

NEW GANO ST OFF-RAMP – A STA. 17+98.73 =
PROP GANO ST CONNECTOR STA. 132+34.89
N 268840.6106
E 358151.0644

℄ CURVE DATA
Δ = 13°28'33"
R = 1000.00'
T = 118.14
L = 235.20'

PC 29+36.71

PT 21+04.94

PT 112+29.87

PT 212+24.59

NOTES:

1. THIS AREA IS TO BE LANDSCAPED AS DIRECTED BY THE CITY OF PROVIDENCE. SLOPES ARE TO BE TREATED WITH 4" OF LOAM AND A SEED MIX APPROVED BY THE CITY.
2. REGRADED AREAS ARE TO BE TREATED WITH 4" OF LOAM AND A NATIVE WETLAND SEED MIX.
3. RELOCATE EXISTING LIGHT POLES FROM THE OLD GANO STREET OFF-RAMP LOCATIONS TO THE NEW OFF-RAMP.

AECOM

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

DESIGNED BY:	JTS
CHECKED BY:	DMP
DATE:	MARCH 2021
SHEET:	32
OF:	81

SCALE: 1"=40'
GRAPHIC SCALE

REVISIONS			REVISIONS		
NO.	DATE	BY	NO.	DATE	BY

BRIDGE GROUP 57T-10
I-195 WASHINGTON NORTH PHASE 2
PROVIDENCE
EAST PROVIDENCE
CONTRACT: -- VOLUME: 4 RHODE ISLAND

GENERAL PLAN - 3 OF 9

57T-10_V4_009_PLAN.DWG